JAGUAR CONSERVATION ASSESSMENT AND FRAMEWORK FOR ARIZONA, NEW MEXICO, AND NORTHERN MEXICO

Arizona Game and Fish Department
and
New Mexico Department of Game and Fish

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ABBREVIATIONS AND ACRONYMS

The abbreviations and acronyms defined below have been used in an effort to help make this document more concise, and reader friendly.

AGFD	Arizona Game and Fish Department
AZ	Arizona
BLM	Bureau of Land Management
ESA	Endangered Species Act of 1973, as amended
IUCN	International Union for the Conservation of Nature
JAGCT	Jaguar Conservation Team
JAGSAG	Jaguar
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NGO	Non-Governmental Organization
NM	New Mexico
NMDGF	New Mexico Department of Game and Fish
PHVA	Population and Habitat Viability Analysis
US or USA	United States of America
USFWS	U.S. Fish and Wildlife Service

Glossary

Conservation biology:	The branch of biological sciences that deals with the effects of humans on the environment and with the conservation of biological diversity (variety of life forms). It uses principles and experiences from the biological sciences, natural resource management, and the social sciences, oftentimes including economics.
Habitat:	The particular place or environment in which an organism (for example, an animal or plant) occurs. Examples: a species of bat might occupy a maternity roost in a cave but have its late summer roost (post breeding) in the attic of a building or an underpass on a roadway. Its winter roost might be a cave in a different (perhaps more southerly) country. In summer its foraging habitat might be pine forests in the United States, while in winter it might forage in elfin woodland in central Mexico. In short, a species' "habitat" can and often does vary seasonally, in different phases of the life cycle (juvenile, young adult, adult, senescent), in response to changing weather conditions, drought, prey abundance or shortage, or competition with or pressure from other animals. Some species have extremely narrow habitat preferences or tolerances (for example, some mollusks). Others have very, or relatively, broad habitat preferences or tolerances (for example, jaguars and humans). This is partly why it is so challenging for people to expect a specific, narrow definition of a species' habitat.
Historical range:	Where a species used to occur, long ago. Oftentimes the historical range is larger than the currently occupied range, perhaps (for example) because something caused the species' population to decline, or rendered the habitat in an area inhospitable.
Inhabit:	To live somewhere, whether seasonally, year-round, at a specific stage of a life-cycle, etc.
Niche	In ecology, "niche" describes the relational position of a species or population in an ecosystem. The description of a niche may include descriptions of the organism's life history, habitat, and place in the food chain. According to the competitive exclusion principle, no two species can occupy the same niche in the same environment for a long time. The full range of environmental conditions (biological and physical) under which an organism can exist describes its fundamental niche. As a result of pressure from, and interactions with, other organisms (e.g. superior competitors) species are usually forced to occupy a niche that is narrower than this and to which they are mostly highly adapted. This is termed

	the realized niche. Different species can hold similar niches in different locations and the same species may occupy different niches in different locations. If a niche is left vacant, perhaps by extinction or disease, other organisms can fill that position. When organisms are introduced into a new environment, they can occupy new niches or niches of native organisms, out-compete the indigenous species, and become serious pests.
Occupied range:	The portion of a species' historical or recent range that it now inhabits. Occupied implies a portion of the range is unoccupied, perhaps (for example) because of population decline or habitat changes.
Occupied habitat:	The habitats within an area that a species actually inhabits.
Population:	A group of organisms of the same kind, usually the same species, inhabiting a given area.
Scientific method:	The body of techniques for investigation of natural or other phenomena and acquisition of new knowledge of the natural world, as well as correction and integration of previous knowledge, typically based on observable, empirical, measurable evidence, and subject to the laws of reasoning. The scientific method generally involves observation, formulation of a hypothesis, experimentation (data gathering), and analysis and conclusion that validates or modifies the hypothesis.

JAGUAR CONSERVATION ASSESSMENT AND FRAMEWORK FOR ARIZONA, NEW MEXICO, AND NORTHERN MEXICO

1. Introduction

The jaguar (*Panthera onca*) is the largest species of cat native to the Western Hemisphere and the third largest cat in the world. It is listed under the Endangered Species Act (ESA) of 1973 as endangered throughout its range, from the southern United States (i.e. the states bordering Mexico) southward through South America. There is no recent evidence of breeding in the United States, but from 1996 through 2007 occurrence has been confirmed along the U.S.-Mexico border in southern Arizona and New Mexico. The most recent confirmed photographic records of a live wild jaguar in the United States were in Arizona, in January and February 2007.

In 1996, two mountain lion hunters documented jaguar presence in the United States through photographs. The first one, Warner Glenn, was in the Peloncillo Mountains along the Arizona/New Mexico border in March (Glenn 1996). The second, Jack Childs, was in the Baboquivari Mountains in southern Arizona in August (Childs 1998). Their sightings helped stimulate creation of a state-led effort to conserve the species in Arizona and New Mexico through voluntary collaborative-conservation efforts, and thus preclude the need for federal listing north of the U.S.-Mexico border (Johnson and Van Pelt 1997). Both Glenn and Childs, and their families, have been and continue to be directly involved in the borderlands jaguar conservation effort (Childs 2004).

In a *Conservation Assessment and Strategy for the Jaguar in Arizona and New Mexico*, Johnson and Van Pelt (1997) described the current status of the jaguar in the United States and identified and assessed risks (threats) in Arizona and New Mexico. The document described goals, objectives, strategies, and activities to conserve jaguars in the two states, and recognized the need to encourage and support parallel conservation efforts in northern Mexico. A companion Memorandum of Agreement (MOA) executed in 1997 provided for state, federal, and county government participation, under auspices of a Jaguar Conservation Team (JAGCT). Collectively, the two documents are known as the Jaguar Conservation Agreement. The conservation effort continued after the U.S. Fish and Wildlife Service (USFWS; 1997) listed the jaguar as endangered in the United States and affirmed that the AZ-NM Conservation Agreement would serve as a template for protections necessary for conservation of the jaguar.

Since first convening in 1997, the JAGCT has met regularly (twice or more yearly), and has produced three progress assessments (Van Pelt and Johnson 1998; Johnson and Van Pelt 2000; O'Neill and Van Pelt in prep.). It has formed various committees to address key issues and complete important tasks. Notable impediments to success have included: lack of funding; irregular or inadequate agency commitment of resources (e.g. staff time); and ongoing debate among interest groups on key issues, including status of jaguars in the AZ-NM borderlands, applicability of recovery planning to the U.S. population, and what constitutes jaguar habitat. However, among JAGCT's accomplishments are collaboration with Mexico on jaguar conservation, a jaguar-based educational curriculum, enhanced public awareness of jaguar presence and conservation needs, increased penalties under state law for unlawful killing of jaguars (in AZ these increased penalties apply only if the jaguar is delisted federally), a jaguar

detection project (using still and video camera “traps”), a system for evaluating and archiving sighting reports, and regular public forums in Arizona and New Mexico for discussion of jaguar-related issues.

In 2007, the JAGCT remains the focal point of jaguar conservation in the United States and its activities have helped spur companion efforts in northern Mexico. Over the past several years, considerable progress has been made with jaguar conservation in Mexico. Projects are underway in several parts of the country. However, much remains to be done to ensure population stability and promote recovery. Particularly important is conservation of a population approximately 140 miles south of the U.S.-Mexico border. Presence of jaguars in Arizona and New Mexico likely depends on dispersal from that core area (Johnson and Van Pelt 1977; Brown and Lopez-Gonzalez 2001).

In 2006 and 2007, the Arizona Game and Fish Department (AGFD), New Mexico Department of Game and Fish (NMDGF), and their cooperators reassessed the borderlands jaguar conservation effort. The process included developing a new Memorandum of Understanding (initially between AGFD and NMDGF) and this Conservation Assessment and Framework as successors to the original MOA and the Jaguar Conservation Assessment and Strategy authored by Johnson and Van Pelt (1997). This document summarizes current knowledge about the jaguar in the U.S.-Mexico borderlands, and identifies actions by which to facilitate presence of jaguars in the United States and help ensure persistence here and in Mexico.

2. Species Status

2.1 Description

The jaguar is a member of the cat family (Felidae; genus *Panthera*) and is allied with the "roaring" cats. Recent studies of phylogenetic relationships among felid species show jaguars are genetically related to the African lion (*P. leo*), leopard (*P. pardus*), tiger (*P. tigris*), snow leopard (*P. uncia*), and clouded leopard (*Neofelis nebulosa*) (Johnson et al. 2006).

Jaguars are easily identified by their distinctive spotted coat, which has small dots or irregular shapes within larger rosette markings. The spotted rosette pattern might act as camouflage (see Brown and Lopez-Gonzalez 2001:19). No two jaguars have the same coloration or are marked exactly alike (Brown and Lopez-Gonzalez 2001), thus, color and spotting patterns can be used to identify individuals.

Jaguars and mountain lions are among the few species of wild cats that have melanistic (black) individuals. Black jaguars are common in parts of the Americas (primarily southern South America) and are often referred to as "black panthers." However, no black jaguars have been confirmed in the northern Mexico population (including the United States).

The largest species of cat native to the Americas, jaguars measure five to eight feet from nose to tail and weigh 140 to 300 pounds (Seymour 1989). Typically, females are slightly smaller than males (Emmons 1999).

2.2 Taxonomy

Five subspecies of jaguar were recognized by Hall (1981) and eight by Pocock (1939) and Seymour (1989)[1], including two with historical ranges extending into the United States (the Arizona jaguar, *Panthera onca arizonensis*; and the northeastern jaguar, *P. o. veraecrucis*). Records from Arizona, New Mexico, and California are attributed to *arizonensis*, the type specimen of which was collected in 1924, near Cibeque, Navajo County, Arizona (Goldman 1932). Nelson and Goldman (1933) described the distribution of *arizonensis* as the mountainous parts of eastern Arizona north to the Grand Canyon, southwestern New Mexico, northeastern Sonora, and perhaps southeastern California. Jaguar records for Texas, and perhaps Louisiana, have been attributed to *veraecrucis*. Nelson and Goldman (1933) described the distribution of *veraecrucis* as the Gulf slope of eastern and southeastern Mexico, from the coast region of Tabasco north through Vera Cruz and Tamaulipas, to central Texas.

More recent work suggests that subspecies recognition might not be warranted in jaguars. Larson (1997) re-evaluated the skull morphologies that led her predecessors to descriptively assign jaguars to eight subspecies. She applied the same criteria (11 skull characters) and used modern statistical analysis (Multigroup Discriminant Analysis and univariate statistics) to evaluate 170 skulls of known origin. As with other large carnivores reassessed in similar manner during the 1980s and

[1] *Panthera* is used herein as the genus for the jaguar, per Nowak (1999) and others. Various earlier publications, including some of those referenced herein, refer it to the genus *Felis*.

1990s (e.g. wolves), the jaguar results indicated variation within the subspecies exceeded variation between the subspecies. Thus, Larson concluded that subspecies recognition was not warranted. Molecular genetics subsequently supported that conclusion (Johnson et al. 1999), which Nowak (1999) reflected in the Sixth Edition of *Walkers Mammals of the World*. However, Wozencraft (2005) recognized xxx subspecies of jaguar, including *P. o. arizonensis*.

2.3 Population Status and Trends

The jaguar's historical population decline in the United States was concurrent with predator control associated with settlement of land and emergence of the cattle industry, especially in Arizona (Brown 1983, USFWS 1990). Hock (1955) and Lange (1960) summarized jaguar records from Arizona and New Mexico that were known up to that time. Between 1885 and 1959, the reports consisted of 45 jaguars killed, plus 6 sighted and 2 recorded by evidence such as tracks and/or droppings. Brown and Lopez-Gonzalez (2001) documented 58 jaguars killed or photographed in Arizona and New Mexico from 1900 to 2000. When plotted at 10-year intervals, records of jaguars reported killed in Arizona and New Mexico between 1900 and 1980 demonstrated decline characteristic of an over-exploited resident population (Brown 1983). Killing of jaguars for commercial sale of their furs was a factor in exterminating a substantial resident population in central Texas in the late 1800s (Nowak 1975).

Historical records indicate the jaguar was probably an uncommon resident in the United States; evidence of breeding is scant. Although a few females have been reported, evidence of breeding north of Mexico is limited to three reports in Arizona: a reported kill of a female with two kittens near the Grand Canyon between 1885 and 1890 (Lange 1960), a reported kill of a female and her young at the head of Chevelon Creek in 1910 (Brown 1987 and Nowak 1975), and a newspaper report of a female killed and her two kittens captured in the Chiricahua Mountains in 1906 (Brown 1989).

Recent sightings (post-1960) in Arizona and New Mexico appear to be mostly, if not entirely, males of unknown status (transient or resident?). Of the seven animals confirmed between 1960 and 2007, and identified to gender, only one was female. It seems likely these animals dispersed from the core breeding population in central Sonora, Mexico, approximately 140 miles south of the International Border.

2.4 Distribution – Historical and Current

United States – The jaguar's historical range in the United States includes portions of Arizona, New Mexico, California, Louisiana, and Texas. Although there is disagreement about the jaguar's historical status in Arizona-New Mexico (i.e. resident/breeding or transient?), clearly its natural historical range included the southwestern United States (USFWS 1997, Swank and Teer 1989, Brown 1983, Davis 1982, Goldman 1932, Bailey 1905). Brown and Lopez-Gonzalez (2001) compiled the most comprehensive information on this portion of the range, noting that every published jaguar distribution map includes portions of New Mexico and Arizona as part of the historical range.. Records from 1900 to 2000 ranged from the Grand Canyon in Arizona and the Datil Mountains in New Mexico to the U.S. Mexico border (Brown and Lopez-Gonzalez 2001). Hill (1942) cited a report from near Springer, in northeastern New Mexico.

Goldman (1932) believed the jaguar was a regular, but not abundant, resident in southeastern Arizona. Hoffmeister (1986) considered it an uncommon resident in Arizona, concluding that reports between 1885 and 1965 indicated a small but resident population once occurred in southeastern Arizona. Brown (1983) suggested jaguars in Arizona range widely through a variety of vegetation types, from Sonoran desertscrub upward through subalpine conifer forest. Most of the Arizona records to date have been from Madrean evergreen-woodland, shrub-invaded semidesert grassland, and along rivers. Rabinowitz (1997, 1999) suggested the available evidence does not support a conclusion that a significant population, or habitat suitable for establishing a persistent population, exists in the United States.

From 1996 through February 2007, four jaguars were documented and another four probable occurrences were recorded in the United States (AGFD unpubl. data). In 1996, two houndsmen encountered and photographed individual jaguars in separate incidents. The first was Warner Glenn, who photographed a jaguar on March 7, 1996, in the Peloncillo Mountains, along the Arizona-New Mexico border (Glenn 1996). The Peloncillos run approximately north-south to the Mexican border, where they join the beginnings of the Sierra San Luis and other ranges that connect to the Sierra Madre Occidental. The second was Jack Childs, who photographed and video-taped a treed jaguar on August 31, 1996, in the Baboquivari Mountains in southern Arizona (Childs 1998). In February 2006, another jaguar was observed and photographed in Hidalgo County, New Mexico (W. Glenn pers. comm.). Jaguars, including repeat occurrences of known individuals, have also been photographed by remote-sensing cameras along the Arizona-Mexico border, beginning in 2001 and as recently as February 2007 (J. Childs pers. comm.).

Northern Mexico - Swank and Teer (1989) described jaguar distribution in Mexico as a broad belt from central Mexico to Central America. The most northerly established populations known to Mexican officials at that time were in southern Sinaloa and southern Tamaulipas. Although jaguars had been considered relatively common in Sonora in the 1930s and 1940s, Brown (1991) cited a population about 800 miles south of the U.S.-Mexico border as the most northern officially reported. However, despite rumors to the contrary, Brown (1991) did not believe the jaguar was extirpated from northern Mexico, and suggested there might be more jaguars in Sonora than had been officially reported. He mentioned reports of two jaguars killed in central Sonora around 1970, and discussed assertions by local Indians that male and female jaguars still occurred in the Sierra Bacatete, about 200 miles south of Arizona. Brown speculated that a reproducing population of jaguars in those mountains could be the source of individuals that travel northward through the Sierra Libre and Sierra Madera until they reach Arizona.

Brown and Lopez-Gonzalez (2001) summarized jaguars reportedly killed or captured in the Mexican states of Sonora and Chihuahua from 1900 to 2000. They also discussed an extant population in Sonora, and another in the rugged *barrancas* (canyons) connecting northern Sinaloa and Sonora. Other reports and photographs indicated jaguar populations in the Sierra Bacatete and adjoining lands in the Yaqui Indian area in southeastern Sonora. The most northerly population was within a 50-mile radius of the towns of Huasabas and Sahuaripa, about 140 miles south of the U.S.-Mexico border.

For purposes of this document, the range of the northern jaguar population is considered to extend from Alamos, Sonora, Mexico north through the Sierra Madre Occidental of Chihuahua and Sonora and the river valleys, foothills, and scrublands of central Sonora north into southern Arizona and New Mexico.

2.5 Habitat

Little is known about characteristics of habitat used by jaguars in the northern extent of their range. Jaguars are known from a variety of vegetation communities (Nowak 1991, Seymour 1989), including those found in the arid Southwest (Nowak 1994). Toward and at middle latitudes, they show a high affinity for lowland wet communities, typically swampy savannas or tropical rain forests. However, they also occur in upland vegetation communities in warmer regions of North and South America. Swank and Teer (1989) stated that jaguars prefer a warm, tropical climate, usually associated with water, and are rarely found in extensive arid areas. However, jaguars occur in dry tropical forest in Jalisco (B. Miller pers. comm.), and were reported by local residents as recently as 1991 to be not unusual, and in fact, still hunted, in the arid Sierra del Bacatete of Sonora, Mexico (D.E. Brown and T.B. Johnson pers. comm.). In January and February 2007, a jaguar was repeatedly documented in arid thornscrub and grasslands in south-central Arizona (J. Childs and E. McCain pers. comm.).

Knowledge of jaguar distribution and ecology suggests this species uses a variety of habitats at the northern edge of its range. This is typical of wide-ranging "top carnivores," which tend to have less finite habitat requirements or preferences than many species. Recently, several studies have helped refine general understanding of habitats that have been or might be used by jaguars in Arizona and New Mexico, including studies by the Sierra Institute Field Studies Program (2000), Hatten et al. (2002 and 2005), Menke and Hayes (2003), Boydston and Lopez-Gonzalez (2005), and Robinson and Bradley (2005).

Conclusions about the conservation importance of historical and current habitats in Arizona and New Mexico vary widely, depending on assumptions factored into the analyses, including reliability of historic records and their significance as a predictor of habitat quality and value, and use by jaguars. For example, Boydston and Lopez-Gonzalez (2005) described land cover types where jaguars occurred. Predicted jaguar occurrences were on average warmer, sunnier, and had older soils than the study area as a whole. Jaguars were not predicted to occur on Sonora's coast, but one male has been recorded there. Jaguars occur in similar coastal habitats in Colombia, South America, in mangrove swamps at the mouth of the Rio Magdalena (T.B. Johnson pers. comm.).

In commenting on habitat aspects of jaguar conservation in the Southwest, A. Rabinowitz (pers. comm.) considered prey availability and abundance "the one overwhelming determinant of where big cats reside," and cautioned that "if you take this out of the equation [in describing jaguar habitat], then you are not looking at jaguar habitat or potential habitat. You are simply looking at land suitability characteristics for jaguars." Rabinowitz added that concerns about prey base in the core area of the northern jaguar population (in Mexico) were sufficient to warrant concern about long-term viability of that population.

2.6 Pertinent Biological and Ecological Factors

The list of prey taken by jaguars range-wide includes more than 85 species (Seymour 1989). Known prey include peccaries (javelina), capybara, paca, armadillos, caimans, turtles, livestock, and various birds and fish. Although it is commonly thought that javelina and deer are mainstays in the diet of jaguars in the U.S.-Mexico borderlands, other available prey, including livestock, are probably taken as well. A single event of livestock depredation by a jaguar was confirmed in Arizona in 2007 (J. Childs and E. McCain pers. comm.).

Like most large carnivores, jaguars have relatively large home ranges. According to Brown and Lopez-Gonzalez (2001), their home ranges are highly variable and depend on topography, available prey, and population dynamics. However, little information is available on this subject outside tropical America, where several studies of jaguar ecology have been conducted. Quigley and Crawshaw (1992) estimated a minimum of 772 to 1160 mi^2 is needed to support 30 to 50 adult jaguars; the actual area depends on prey density, habitat composition, and the amount of human exploitation. Individual jaguar home ranges vary from 11 to 16 mi^2 in Belize (Rabinowitz and Nottingham 1986) and from 10 to 20 mi^2 in Jalisco, Mexico (B. Miller pers. comm.). In Jalisco, home ranges tend to be smaller in the dry season than in the wet season, and females with young kittens tend to have smaller home ranges than those with older kittens (B. Miller pers. comm.). However, B. Miller (pers. comm.) noted that individuals recorded at the same location on consecutive days actually traveled as much as nine miles overnight before returning to that location. The average home range of radio-collared male jaguars in Venezuela was 19 to 30 square miles (49 and 78 sq km) (Brown and Lopez-Gonzalez 2001:60).

A recent publication on sexual differentiation in distribution potential of northern jaguars modeled distributions of males and females (Boydston and Lopez-Gonzalez 2005). The results indicated eastern Sonora appeared capable of supporting male and female jaguars, with potential range expansion into southeastern Arizona. New Mexico and Chihuahua had environmental characteristics primarily limited to the “male niche,” and thus might be areas into which only males occasionally disperse. Boydston and Lopez-Gonzalez (2005) further suggested that environmental requirements for females might be limiting distribution of northern jaguars.

There is little reason to think that jaguar distribution is static. Over the past 100 years, the climate in the Southwest has become warmer and drier. The effects and importance of climate change on historical and future jaguar distribution at the northern periphery of the range are unknown, but indirect effects (e.g. diminished prey base) might be important. In the more arid portions of the Southwest, effects on availability of surface water might also come into play.

Channell and Lomolino (2000) assessed the importance of populations at the periphery of their range, in a study of dynamic biogeography and conservation of endangered species. In contrast to more common opinions, their analysis suggests that populations persist longest at the extremes of their range, and accordingly such populations might deserve greater conservation focus than do “core” populations. It is an intriguing concept, and needs careful scrutiny to determine how, if at all, the findings relate to northern jaguar conservation.

2.7 Regulatory Mechanisms

Convention on International Trade in Endangered Species - The jaguar is listed under the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) as an Appendix 1 species. CITES prohibits international trade among member nations in Appendix 1 species, including trophies, skins, and products.

Mexico – Mexico's federal government lists the jaguar as an endangered species throughout Mexico.

Endangered Species Act - The jaguar's federal status was changed administratively in 1972, when USFWS listed it as an endangered species, under the Endangered Species Conservation Act of 1969 (ESCA). Two lists of endangered wildlife were maintained under ESCA: one for foreign species and one for species native to the United States. The jaguar appeared only on the List of Endangered Foreign Wildlife. In 1973, the ESA superseded the ESCA. The foreign and native lists were replaced by a single "List of Endangered and Threatened Wildlife" - September 26, 1975 – 40 FR 44412-44429). The jaguar was listed only in Mexico and Central and South America. On July 22, 1997, USFWS extended endangered status to the jaguar throughout its range, including the United States, under authority of the ESA (USFWS 1997).

State of Arizona - Jaguars are listed as nongame mammals under AGFD Commission Order 14, with no open season for legal take by hunting. Violation of this order is a Class 2 misdemeanor. In 1998, AGFD successfully advocated state legislation (Senate Bill 1106) imposing a $2500 criminal penalty (Class 2 Misdemeanor) and up to $72,500 in civil penalties for unlawful take of a jaguar. These fines are commensurate with current federal fines under the ESA. The state legislation was signed into law on May 7, 1998, but only takes effect if the jaguar is removed from the federal endangered species list. The legislature's stated desire was to ensure that state penalties would not be additive to current federal penalties, and would serve as an inducement to federal delisting.

State of New Mexico- The State of New Mexico classifies the jaguar as a Restricted species (19.33.6.9 NMAC) because of its status as an Appendix 1 species under CITES. In 1999, during the 44th New Mexican Legislative Session, Senate Bill 252 was signed into law, establishing new regulations and penalties for illegally killing a jaguar. These would also take effect only if the jaguar is removed from the federal endangered species list. Although this law provided state penalties as high as those for any animal protected by the state of New Mexico, the penalties are not as high as those under the federal ESA. In the 2006 New Mexico legislative session, House Bill 536 ("Unlawful Trophy Animal Disposition") was passed and signed into law. It allows the New Mexico Game Commission to establish regulations authorizing higher civil damages than previously allowable for wildlife designated as trophy animals, and establishes a minimum $2000 in civil penalties (without requiring removal from ESA listing to take effect). Thus, higher penalties for illegal jaguar killing may be established through Commission action.

3. Conservation Status

3.1 Threats

The Federal Register entry listing the jaguar as endangered (USFWS 1997) stipulated that, based on the best available information, the following actions (potentially perceived as threats) will not result in a violation of Section 9 (Prohibited Acts) of the ESA, provided these activities are carried out in accordance with any existing regulations and permit requirements:

a. Normal ranching activities, except predator control targeting large cats that result in inadvertent trapping or mortality of a jaguar.
b. Habitat clearing, except in areas where jaguars are known to exist or have been known to exist.
c. Fencing or other property delineation.
d. If, when using dogs, a jaguar is inadvertently chased and/or treed by the dogs, so long as the dogs are called off upon realization that a jaguar is being chased.

USFWS noted that take by any of the following activities would likely violate section 9 of ESA:

1) Any activity specifically prohibited by ESA (e.g. shooting, hunting, trapping, etc.)
2) Intentional clearing or destruction of habitat known to be occupied by jaguars.
3) Any activities that fall within the definition of harass and harm. USFWS defines the terms harass and harm as follows: Harass means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm has been defined as an act which actually kills or injures wildlife. Such acts may include significant habitat modifications or degradation when it actually kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding or sheltering.
4) Predator control activities targeting large cats that trap, kill, or otherwise injure jaguars.

According to the 1997 federal listing, the primary threat to jaguars in the United States is illegal shooting. The most recent known killing of a jaguar here was in 1986, in Arizona (Brown and Lopez-Gonzalez 2001). Although the demand for jaguar pelts apparently has diminished, it still exists, along with the business of illegal hunting of jaguars in Mexico. Conflicts with ranchers also might still result in jaguar killings in Mexico(Lopez-Gonzalez 2004).

Loss, fragmentation, and modification of jaguar habitat have contributed to population declines throughout much of the species' range, including northern Mexico (Medellin et al. 2002). Although the extant population in Sonora occurs in an extremely rugged area (Lopez-Gonzalez 2004), further habitat loss and road development are at least potential threats. Urbanization, including subdivision and subsequent habitat fragmentation in rural areas, is prevalent in much of the United States and Mexico where jaguars occur or have occurred, and is increasing.

Since the tragic events in the United States on September 11, 2001, it has become more likely that International Border issues such as lighting, fencing, road construction and maintenance, vehicle traffic, bridges, border surveillance and security activities, and habitat alteration to facilitate law enforcement might influence jaguar presence and conservation (USFWS 2003, Defenders of Wildlife 2006). The North America Free Trade Agreement of 1994 increased border monitoring associated with illegal immigration, starting in 1998, and homeland security activities since 2001 have impacted other endangered species (e.g. ocelot in Texas) and have the potential to impact current and future jaguar conservation efforts by limiting natural movement across the border (in either direction). For example, illegal immigration and homeland security operations are being pushed from traditional entry points into more inaccessible zones, where impacts on the jaguar and other species might be high (Ackerman 1998). Many of these areas traditionally had little human disturbance. With drafting of the *Programmatic Environmental Impact Statement for US Border Patrol Activities within the Border Areas of the Tucson and Yuma Sectors, AZ* in October 2002 (Immigration and Naturalization Service 2002), border security actions will need to be addressed as they relate to jaguar conservation and maintaining and enhancing wildlife connectivity between the United States and Mexico.

Drug trafficking and illegal immigration by foot or vehicle across the U.S.-Mexico border have become significant problems in the area occupied or possibly occupied by jaguars. The traffic and the enforcement effort attempting to end it both impede jaguar studies. Camera traps have been destroyed, and it is not safe for biologists to work in some key areas. Collectively, the huge and apparently increasing numbers of border crossers are leaving behind literally tons of trash. Poaching of wildlife, particularly animals that are common prey of jaguars (e.g. deer and javelina), as subsistence food is widely evident. In many areas, loss of shrubs and undergrowth to make room for primitive camps and to fuel campfires has substantially changed the habitat. Perhaps as important is disruption of jaguar and prey movements due to the nocturnal nature of the human traffic, which tends to use areas with difficult access for enforcement officials. Some of these are the same areas in which jaguars have occurred recently.

3.2 Conservation Efforts and Research in the United States

Conservation efforts are ongoing for the jaguar; many are voluntary actions by non-governmental entities. Below, we summarize known conservation and research efforts being conducted on jaguars in the borderland region. Studies to assess the status and ecological needs of the jaguar within the borderlands region are also summarized.

Jaguar Conservation Team – In September 1996, AGFD, NMDGF, and Texas Parks and Wildlife Department began discussing a possible conservation agreement for jaguars. Texas soon dropped out of the effort, anticipating that if Federal listing for the species in the United States occurred, it would not include the *veraecrucis* subspecies that historically occurred in Texas. AGFD and NMDGF persisted, finalizing a *Conservation Assessment and Strategy for the Jaguar in Arizona and New Mexico,* on March 24, 1997 (Johnson and Van Pelt 1997). The document described the current status of the jaguar in the United States, and identified and assessed risks in Arizona and New Mexico. The conservation strategy portion of the document described goals, objectives, strategies, and activities intended to conserve jaguars in Arizona and New Mexico.

On April 30, 1997, the Jaguar Conservation Team (JAGCT) formed under the strategy held its first meeting, in Douglas, Arizona. JAGCT is composed of agencies signatory to a March 24, 1997 *Memorandum of Agreement for the Conservation of the Jaguar in Arizona and New Mexico* (hereafter MOA). It meets periodically to discuss recent jaguar sightings, management issues, education needs, and research efforts. Each MOA signatory agency has one voting representative on JAGCT. In accordance with the MOA, JAGCT established a Jaguar Working Group (JAGWG) to provide for direct public involvement in addressing specific jaguar conservation issues and reporting recommendations to JAGCT. JAGWG is thus comprised of an innovative group of ranchers, stakeholders, and state and federal representatives. Since 1997, JAGCT has established camera-monitoring in Arizona, identified habitats known to have been used by jaguars and/or potentially of use to jaguars, and developed a jaguar-centric teaching guide that meets both national and state education standards.

In 2007, AGFD and NMDGF executed a new Memorandum of Understanding (MOU) for jaguar conservation (see Appendix A), and invited participation by previous cooperators and others. This Framework was completed under that MOU, to guide the conservation effort henceforth. The first JAGCT meeting under the new MOU was held in Douglas, Arizona, on May 2-3, 2007. Since JAGWG essentially constituted a public meeting of JAGCT, the term was deemed irrelevant and dropped from the new MOU and this Assessment/Framework. The public still has full opportunity to participate, through public JAGCT meetings and committee functions.

U.S. Fish and Wildlife Service – The USFWS (1990) *Listed Cats of Texas and Arizona Recovery Plan (With Emphasis on the Ocelot)* addresses the jaguar and jaguarundi, but primarily focuses on the ocelot. The plan only provides limited information on the jaguar, stating that the status in northern Mexico needs to be determined before recovery recommendations can be made.

Malpai Borderlands Group - The Malpai Borderlands Group (MBG) consists of private landowners living in the borderlands of southeastern Arizona and southwestern New Mexico, near the U.S.-Mexico border. These borderlands total approximately one million acres and include approximately 30 privately-owned ranches, as well as a mosaic of state and public lands. MBG's goal is to restore and maintain the natural processes that create and protect a healthy, unfragmented landscape, to support a diverse, flourishing community of human, plant, and animal life. After Warner Glenn's 1996 sighting and photographs of the jaguar in the Peloncillo Mountains, MBG met with AGFD and NMDGF and the Bureau of Land Management, Forest Service, and USFWS to discuss the sighting's implications. As a result, MBG established a fund to help compensate ranchers for livestock confirmed to have been killed by jaguars. A portion of the proceeds from the book, *Eyes of Fire: Encounter with a Borderlands Jaguar* (Glenn 1996), in which Warner Glenn described his 1996 jaguar sighting in the Peloncillo mountains, is donated to the Jaguar Fund.

Northern Jaguar Project - The Northern Jaguar Project, Inc., a non-profit organization based in Tucson, Arizona, is dedicated to conservation of jaguar habitat in Sonora and creation of a safe-haven corridor between the Sonoran breeding population and the United States/Mexico borderlands. The Project promotes conservation ranching and stewardship, and increased regional awareness of the value of wildlife, particularly of charismatic endangered species like the jaguar. It also works to eliminate conflict between ranchers and wildlife, particularly

mountain lions and jaguars. It has partnered with Naturalia (see below) to set up jaguar preserves in Mexico. The two organizations have an MOA to cooperate in management, operation, and expansion of the existing reserve in northern Sonora, Mexico.

All funding received by the Northern Jaguar Project goes to support protection of habitat and wildlife in the Northern Jaguar Reserve and the surrounding area. The Project operates a small field station and research program on the reserve, in conjunction with Naturalia. Researchers are conducting studies related to large carnivores, using trip cameras and hair snares to gather data on population densities, movement, dispersal, diet, and habitat needs. Visiting researchers are conducting plant inventories and making preliminary lists of birds and insects. The Project's "jaguar guardian" program maintains a permanent presence on the reserve, to help ensure protection for all species.

Borderlands Jaguar Detection Project. Early in the JAGCT's development, the Borderlands Detection Project was created to assess jaguar presence in south-central Arizona and eventually (funding permitting) across the entire span of possible occurrence in Arizona and New Mexico. It has become the primary JAGCT vehicle for increasing knowledge of jaguars in the area. As of May 2006, the Project had documented 62 jaguar events inside the state of Arizona since its initiation in 2001 (McCain et al. 2006). This included 42 photographs and 12 sets of tracks. Ten scat/fecal samples were collected (Haynes et al. 2005), but DNA analysis in 2006 did not confirm them as being of jaguar origin (M. Culver pers. comm.). The photo and track detections confirmed occasional presence of two adult male jaguars, and possibly a third unidentified, unsexed individual in southeastern/southcentral Arizona since 1996. [Note: more occurrences were confirmed in 2006 and early 2007 after McCain et al. (2006) was completed, and are not reflected in this passage.]

3.3 Conservation and Research Efforts in Mexico

On October 12-15, 2005, Mexico, under direction of CONANP (Comision Nacional de Areas Naturales Protegidas, the National Commission for Protected Natural Areas) sponsored the 21st Century Mexican jaguar symposium. CONANP recognizes the value of conservation strategies, known as PREPs, for diverse species and the need to identify threats to species and prioritize consensus actions, set specific dates, and establish clear goals, indicators of success, responsible parties, resources, and follow-up to implement actions for conservation. Direct actions would include protection, management, and restoration of the species and its habitat. Indirect actions would include information dissemination, integrating jaguar conservation into the existing fabric of local cultures, and administration, all in an Action Plan for jaguar conservation over a five-year period. JAGCT participation in this symposium furthered coordination and cooperation between the two countries at a variety of levels.

Jaguar conservation in Mexico was elevated to the highest level of government when the President of the Republic declared 2005 to be "The Year of the Jaguar." Approximately 38,000 hectares of the Sierra de Vallejo in Nayarit were decreed as State Natural Protected Areas, in cooperation with Hojanay (a nongovernmental organization). Banamex and the Fideicomiso Fund for Natural Heritage in Mexico reached an agreement with the Ejido Ursilo Galvan (a local cooperative from the same mountain range) to set aside 1900 hectares as an Ejidal Sanctuary for

the jaguar. Likewise, Mexico signed a brotherhood pact for protected areas with Belize and Guatemala to support a biological corridor in this critical area of "Jaguars without Borders" with Unity for Conservation (another nongovernmental organization). State-specific jaguar conservation strategies have been produced for Jalisco, Michoacán, and Oaxaca. In cooperation with PROFEPA (Procuraduría Federal de Protección al Ambiente, the Federal Ministry for Environmental Protection), communities and nongovernmental organizations have implemented community watch groups in 14 states. There are 25 watch groups, with more than 400 rural community members that protect areas to stop illegal hunting and change land use.

Mexico's jaguar conservation planning efforts continued in 2006, with a March workshop conducted by the National Institute of Ecology. The stated goal was to develop a plan for Mexico that will lead to recovery of the jaguar in Mexico. Key objectives were to evaluate the current status of the jaguar in Mexico; determine threats to jaguar existence; and determine priority conservation actions at the local, regional, and national scale. Subcommittees were established to work at the local level, including one for the northern jaguar population in Chihuahua and Sonora. Again, JAGCT participation provided opportunities for both countries to share experiences and inform development of mutual conservation strategies, including research projects that would help fill the information gaps that impede progress.

In November 2006, Mexico hosted an invited-participation Population and Habitat Viability Analysis (PHVA) workshop for the jaguar, in Cuernavaca, Mexico. Again, JAGCT participated, and on JAGCT's behalf AGFD provided funding that helped support the workshop. The IUCN Conservation Breeding Specialist Group facilitated the event. More workshops are anticipated, as relevant information is generated through field projects, and the process is intended to eventually generate extinction risk assessments based upon information on the life history, population dynamics, ecology, and history of the populations. The November workshop again underscored the need to develop regional jaguar management (conservation) plans, including one for the northern jaguar population (Sonora-Sinaloa region). Support for this concept will be garnered, and a lead for the Sonora-Sinaloa area requested or identified, at the 2007 Trilateral Committee meeting, in Canada.

Naturalia is one of Mexico's most active and forward-looking conservation organizations. In 2003, Naturalia purchased a 10,000-acre ranch in northern Sonora that has become the core of a new jaguar reserve. The reserve is dedicated to protection of jaguars and all other wildlife species present, and to rehabilitation of habitat. It has a small research field station, one of a handful in Sonora. Staffing and operations at the field station are the responsibility of the Northern Jaguar Project. At the reserve, biologists are working on the first inventories of birds, mammals, butterflies, and plant species ever done in northern jaguar habitat. In 2006, Naturalia obtained a 3-year option to purchase a ranch bordering the 10,000 acres it has already purchased (D. Hadley pers. comm.).

Another trip camera project has recently been implemented in Sonora, south of the New Mexico border, with a goal to document jaguar presence in the area (C. Lopez-Gonzales pers. comm.).

4. Conservation Framework.

4.1 Introduction.

AGFD and NMDGF have crafted this Framework for jaguar conservation to reflect the paramount importance of cooperation with and participation by a broad spectrum of government agencies, private individuals, and nongovernmental organizations. The Framework also acknowledges the importance of compatible rural livelihoods and activities (such as ranching and outdoor recreation, including hunting, fishing, and wildlife watching) to existence of jaguars in the Southwest, and the importance of participation by such stakeholders in wildlife conservation. Thus, the Framework's focus is voluntary collaborative conservation, based on shared values and incentives rather than regulatory requirements.

4.2. Goal: Conserve Northern Jaguars in the U.S.-Mexico Borderlands.

4.3. Organizational Structure.

4.3.1 Memorandum of Understanding (MOU)..

4.3.1.1 AGFD and NMDGF have executed a 2007 MOU for jaguar conservation (see Appendix A), supporting their broader commitments under Section 6 of the ESA to maintain adequate conservation programs for species of wildlife of mutual concern with USFWS. This Framework will be implemented under the MOU, and any successor agreements.

4.3.1.2 Signatories to the MOU are limited to government agencies, which collectively comprise the JAGCT (see below), but participation in the jaguar conservation effort is open to anyone. Timelines for implementing and completing Conservation Actions within this Framework will necessarily depend on funding and availability of personnel and other resources. Note: participation is voluntary; entities need not contribute funding or other resources to formally or informally participate in the conservation effort.

4.3.1.3 The Framework is not a regulatory document. It reflects the AGFD and NMDGF commitment to conserving the jaguar in the context of a wide spectrum of other wildlife needs and a variety of uses of federal, state, tribal, and private lands. It will be implemented in coordination with many other planning and management efforts on federal, state, tribal, and private lands, including ecosystem management, wildlife management, allotment management, etc. Note: responsibility for changing plans or taking actions in response to JAGCT recommendations developed under this Framework rests with the appropriate lead (action) agency.

4.3.1.4 Although this Framework applies to the full historical range of the northern jaguar population, conservation effort will be focused in a priority geographic area (i.e. primary emphasis area) that includes all or parts of Santa Cruz, Pima, Pinal, Graham, Greenlee, and Cochise counties in Arizona and all or parts of Catron, Sierra,

Luna, Grant, and Hidalgo counties in New Mexico. This will allow available JAGCT resources to be focused where a substantive conservation return is most likely. Expansion of the priority area to include other parts of Arizona and/or New Mexico will be addressed as necessary. Conservation effort in Mexico under this Framework is subject to invitation by and permission from Mexico.

4.3.2 Jaguar Conservation Team (JAGCT).

4.3.2.1 Agencies signatory to the MOU for jaguar conservation (see Appendix A) are known as Lead Agencies (AGFD and NMDGF) or Cooperators (all others). The distinction reflects that this is a state-led conservation effort, in accordance with applicable state and federal law and AGFD and NMDGF cooperative agreements with USFWS under Section 6 of the ESA. Collectively, the MOU signatories comprise the JAGCT, as noted above. Terms and conditions of eligibility and participation as signatories are detailed in the MOU.

4.3.2.2 Interested private individuals and nongovernmental organizations are invited and encouraged to participate in this Framework by attending JAGCT public meetings and by participating in voluntary actions to promote jaguar conservation, including public education activities.

4.3.2.3 Information on JAGCT meetings and activities is provided on AGFD's Web site and through AGFD's self-subscription electronic newsletter, *Endangered Species Updates*.

4.3.2.4 AGFD and NMDGF will work through the JAGCT to coordinate and direct activities under this Framework, subject to the terms and conditions of the referenced MOU. In this manner, they will review any new information, outline management guidelines, research, and education needs, and identify known and potential funding sources for carrying out this work.

4.3.2.5 AGFD and NMDGF will convene the JAGCT at least once annually, and more often as deemed necessary. Agendas for JAGCT public meetings will be available to the public at least 21 calendar-days in advance, via notice disseminated through a self-subscription electronic newsletter, AGFD's *Endangered Species Updates*.

4.3.2.6 JAGCT public meetings will be held in available venues in the primary emphasis area for this Framework. When possible, meetings will rotate between AZ and NM. In the event that jaguars are found to occur in other areas of AZ and/or NM, JAGCT meeting locations will be adapted to ensure that each general area of occurrence has an equitable share of the meetings.

4.3.3 Jaguar Scientific Advisory Group (JAGSAG).

4.3.3.1 JAGCT will provide a sound scientific basis for jaguar conservation and a forum for constructive information exchange, in part by maintaining an independent JAGSAG to review appropriate aspects of its work, such as survey, monitoring, research, and management recommendations..

4.3.3.2 The JAGCT Chair will appoint JAGSAG members, giving preference to individuals with extensive expertise in the areas important to jaguar conservation. JAGSAG members may serve in that capacity until they or the Chair determine otherwise.

4.3.3.3 JAGSAG service is voluntary, without commitment to compensation, although if funds are available JAGCT or any entity may opt to provide support to JAGSAG members for travel or other expenses directly related to their service to JAGCT. JAGSAG meetings will be held as often as needed, and may be conducted through teleconference or email to facilitate member participation

4.3.3.4 The JAGCT Chair will make JAGSAG's recommendations and guidance to JAGCT available to the entire JAGCT and interested members of the public.

4.3.4 Conservation and Cooperation with Mexico

4.3.4.1 This Framework encourages participation by Mexico in JAGCT meetings, and solicits cooperation from federal, state, and local agencies and organizations in Mexico that are involved in research on or conservation of the northern jaguar population. AGFD, NMDGF, and USFWS will ensure that coordination with Mexico occurs within the framework of the Trilateral Committee. The Trilateral is comprised of federal wildlife agencies from the United States, Mexico, and Canada, and other federal agencies, state agencies, nongovernmental organizations, and individuals participate on an invitation basis.

4.3.4.2 Through the Trilateral Committee, JAGCT will continue to encourage and support Mexico's efforts to determine the present distribution and status of jaguars and jaguar habitats in Mexico; identify areas important to natural movement of jaguars between Arizona, New Mexico, and Mexico; and develop a national conservation strategy in Mexico for jaguars.

4.3.4.3 JAGCT will continue to work with Mexico toward integrating the emerging national Mexico jaguar conservation strategy and this Framework, and to make available to Mexico any relevant information from the United States. JAGCT will also cooperate at the regional and local levels, as the subcommittee that Mexico has tasked with developing conservation strategies for the northern jaguar population begins functioning.

4.3.5 Cooperation with the Native American Nations

4.3.5.1 JAGCT will encourage Native American Tribes within the primary emphasis area for this Framework in the United States to become signatories to the MOU. JAGCT will also provide technical support, when requested, to appropriate Native American Tribes in the United States to help determine present distribution and status of jaguars and to identify possible jaguar travel areas.

4.4 Objectives and Conservation Actions.

Objectives to achieve the Goal of this Framework are identified below. Conservation actions are listed under each objective, but are not priority ranked. Note: Private lands will not be entered pursuant to this Framework without prior permission from the landowner(s). Note: This Framework does not provide for or support reintroduction of jaguars into AZ or NM. Reintroduction would be cost prohibitive, and not scientifically advisable this far north in the species' range.

4.4.1 Objective: Identify habitat characteristics and document distribution and occurrence of jaguars in the U.S.-Mexico borderlands..

4.4.1.1 JAGCT will review relevant literature, advocate and provide support for jaguar studies, and incorporate findings from other studies to identify and continually refine understanding of jaguar habitat-use patterns, using appropriate field-tested methods.

4.4.1.2 JAGCT will document northern jaguar distribution and occurrence by developing and maintaining a survey and monitoring program to detect and gather occurrence, habitat use, and other information. The program will include a voluntary-participation survey of ranchers and other "back country" inhabitants and users to help determine current and recent occurrence of jaguars.

4.4.1.3 When jaguars are found alive in Arizona and/or New Mexico, or along the International Border, AGFD, NMDGF, and USFWS will make a concerted effort to monitor their movements through the least intrusive but most effective means.

4.4.1.4 Through permit stipulations, AGFD and NMDGF will require that any jaguar captured in AZ or NM be reported to the appropriate state wildlife agency and USFWS before release, so they can decide whether to radio-collar and monitor it. However, if the trapped animal is in danger of debilitating injury or death, it shall immediately be released and the appropriate state wildlife agency will, if feasible, coordinate subsequent monitoring and assessment of the trap location.

4.4.1.5 JAGCT will coordinate and maintain a sighting report procedure and database for information about jaguar occurrence. The system and data will reside with AGFD and NMDGF, and include detailed criteria by which to assign credibility rankings to each sighting report, so confirmed records become the primary basis for JAGCT recommendations and actions. The criteria shall address such factors as type and

quality of sighting (e.g. distinct tracks, clear and well focused photograph, detailed sight record), the observer's experience with jaguars and similar species, weather conditions at time of sighting, total time that the animal was under observation, etc.

4.4.1.5 Possible jaguar occurrence reports will be assigned standardized credibility rankings, and evaluated by one or more experts in the field as to accuracy and importance. When a reported occurrence has been determined not to be of a jaguar, it shall be labeled as such and categorized appropriately in subsequent JAGCT reports.

4.4.1.5 As necessary, and in timely fashion, JAGCT will seek funding and other support from signatories, outside agencies, organizations, and individuals for the work referenced above.

4.4.2 Objective: Identify and map habitat of the northern jaguar population, including key linkages from Mexico to the United States.

4.4.2.1 JAGCT will coordinate with partners in Mexico and the United States to identify and assess areas in which jaguars occur or might occur, as transients or otherwise. At a minimum, these assessments will consider the physical features important to jaguars for connectivity. Where possible, they will also characterize other potentially important aspects or conditions (e.g. prey base).

4.4.2.2 AGFD and NMDGF will maintain and revise as needed state-specific maps delineating land ownership patterns overlaid with jaguar distribution information, including points of known or reported occurrence, together with habitat types in which jaguars are known to occur or likely to occur. Private lands on such maps will not list (or be described by) individual property names or owners. These maps will be a primary basis for evaluating constraints to, and opportunities for, enhancing jaguar presence within each state, i.e. they will help focus JAGCT efforts to ensure that jaguars are not killed unlawfully or unintentionally and that their ability to move freely across the landscape is not unnecessarily constrained.

4.4.3 Objective: Assess threats to the northern jaguar population and identify limiting factors.

4.4.3.1 JAGCT will, in cooperation with partners in the United States and Mexico, provide recommendations for assessing the benefits and negative impacts of current and planned actions on jaguars in the United States and Mexico.

4.4.3.2 JAGCT member agencies will share information on any impact assessments they conduct regarding proposed actions where jaguars might occur, and provide those results to JAGCT for informational purposes and possible referencing in reports. JAGCT member agencies may ask other member agencies to assist with impact assessments, although assessments will typically be part of the agency’s existing review and evaluation process for proposed actions (e.g. NEPA and ESA Section 7 compliance measures), where applicable.

4.4.4 Objective: Conserve northern jaguar population habitat, including key linkages between Mexico and the United States.

4.4.4.1 JAGCT will cooperate with Mexico to develop jaguar conservation recommendations and guidelines, monitor and evaluate issues of concern, and encourage land and resource managers to ensure that current and future needs for northern jaguar persistence and natural dispersal are appropriately addressed.

4.4.4.2 JAGCT will provide technical assistance and conservation recommendations to the Border Patrol and other federal agencies in the United States on issues that might constrain jaguar movement between the United States and Mexico (e.g. border security actions, border infrastructure, and illegal immigration) or jaguar occurrence in the United States.

4.4.4.3 JAGCT will identify and develop incentives for landowners to encourage presence of jaguars within the primary emphasis area, and encourage individual agencies within JAGCT to work with willing landowners to execute agreements to protect jaguar habitat, including movement corridors, through voluntary mechanisms including but not limited to conservation easements and Safe Harbor Agreements.

4.4.4.4 Private property owner claims in the United States for compensation for livestock lost to jaguar depredation will be referred to the Malpai Borderlands Group (MBG) for evaluation and possible payment from a fund established by MBG for that purpose. Payment will be based on compensation and jaguar kill identification guidelines approved by MBG. MBG will voluntarily provide JAGCT with updates to the guidelines, to help JAGCT work with Mexico to determine if a similar program can be developed for Mexico.

4.4.4.5 JAGCT will conduct local workshops to identify landowner, manager, and permittee concerns related to jaguar conservation and to develop possible solutions. Workshops will incorporate discussion of conservation biology, property rights, land-use philosophies, and other relevant topics. They will involve or be open to JAGCT members, agency decision-makers, and interested members of the public.

4.4.4.6 JAGCT will help implement conservation measures on private lands only in response to invitation from the appropriate landowner(s). Private property owners shall not involuntarily be subject to any such measures.

4.4.5 Objective: Promote Protection of Jaguars in the United States.

4.4.5.1 Predator control activities by signatories to the MOU will not be purposefully directed at jaguars. Such activities are subject to a variety of federal, state, and tribal laws, local ordinances, and oversight by various federal, state, and tribal land management, wildlife management, and agricultural agencies or programs. Thus, any JAGCT discussions or recommendations regarding possible effects of area-specific

predator control activities on jaguars, and measures to avoid harm to jaguars in such areas, will be carefully coordinated with the appropriate entities.

4.4.5.2 NMDGF will continue to work toward equalizing or increasing New Mexico's civil legal disincentives (fines) for unlawful take of jaguars, to make them commensurate with current federal fines.

4.4.5.3 AGFD and NMDGF will investigate proposing increased state criminal penalties (fines and prison terms) for unlawful take of jaguars, to make them commensurate with current federal penalties under ESA.

4.4.6 Objective: Conduct research to improve knowledge of jaguars, jaguar conservation, and detection and handling of jaguars.

4.4.6.1 JAGCT will sponsor, conduct, and encourage others to conduct research to improve knowledge of jaguars and understanding of how to conserve them in a multiple-use, private/public lands context. JAGCT will use the JAGSAG as available to review and make recommendations on research concepts and proposals.

4.4.6.2 JAGCT will review, and revise as necessary, its procedures for handling jaguars that are captured alive.

4.4.6.3 JAGCT will evaluate (in cooperation with Mexico) the feasibility and utility of a Population and Habitat Viability Analysis/Assessment (PHVA) for the northern jaguar. If a PHVA is found to be feasible, and useful, in forwarding conservation efforts, it will be conducted when and if sufficient data exist and funding is available.

4.4.7 Objective: Develop and implement information and education programs to promote conservation of jaguars and their habitat.

4.4.7.1 JAGCT will review and develop jaguar information and make it available to the public, including updating reports on status, distribution, occurrence, habitat, ecology, and conservation. Draft reports will be submitted to at least three qualified individuals in the appropriate field for review, and to the general public for comment.

4.4.7.2 JAGCT will promote public support of jaguar conservation by developing and distributing information and education materials (e.g. brochures, media kits, web pages). Outreach focal points will include wildlife viewers, hunters, ranchers, farmers, other private landowners, conservation groups, and local governments. Educational materials developed by or for JAGCT shall be reviewed by at least three professional educators with appropriate expertise, and/or a JAGCT Committee.

4.4.7.3 AGFD and NMDGF will promote jaguar conservation in conjunction with advertising their 24-hour "hot lines" (1-800 numbers) for reporting wildlife violations, and rewards for information that leads to convictions. JAGCT will seek

private donations to supplement rewards offered by the state agencies for convictions in cases of unlawful take of jaguars.

4.4.7.4 JAGCT will develop and maintain a balanced, scripted presentation on jaguar conservation for general educational use. Any group that desires to participate in this or a similar JAGCT outreach effort, or to adapt these materials for its own use, whether or not at its own expense, must provide their materials for JAGCT review and acknowledge in the final version of said materials whether or not JAGCT endorsed the final product.

4.4.7.5 JAGCT will disseminate jaguar conservation information through: reports, brochures, and Web-site postings; annual hunting regulation publications; a fact sheet summarizing the status of borderland jaguars and their conservation needs; technical and popular reports; articles for agency and other magazines; and segments for Lead Agency or Cooperator television shows.

4.4.7.6 When practical to do so, and contingent upon available funds, JAGCT will make its information available in Spanish as well as English.

4.4.8 Objective: Evaluate JAGCT progress and accomplishments.

4.4.8.1 Each January-February, AGFD and NMDGF will jointly develop a written report on the previous year's JAGCT effort to conserve the jaguar. The report will reference specific Objectives and Conservation Actions identified in the Framework, identify tasks that were planned for the previous year, and note whether and why the tasks were accomplished or not accomplished. AGFD and NMDGF will give JAGCT Cooperators and the public at least one 30-day review opportunity for the report, before submitting it to USFWS and making it available to the public.

4.4.8.2 JAGCT will use adaptive management principles to evaluate this conservation effort on an ongoing basis, and make necessary changes, based on experience, outcomes, and changed circumstances.

Literature Cited

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